

data processing terminal **200** is operated so that the two touch positions are moved apart, characters and graphics displayed may be enlarged; and when operated so that the two touch positions are moved closer, the characters and graphics may be reduced.

[0056] Furthermore, for example, as shown in **FIG. 8**, when four fingers of the left hand Lh touch the back surface of the data processing terminal **200**, the respective touch position pointers **221**, **222**, **223**, and **224** may be displayed on the display panel **210**; and when four fingers of the right hand Rh touch the back surface of the data processing terminal **200**, the respective touch position pointers **225**, **226**, **227**, and **228** may be displayed on the display panel **210**. When some of these touch position pointers **221** to **228** are overlapped with the respective operation buttons and the like, the input corresponding to each of the overlapped operation buttons is performed and another input process can be preformed based on a relationship among a plurality of touch positions.

[0057] The PDA **100** is exemplified as an apparatus provided with the input device according to the present embodiment. However, in place of the PDA **100**, the input device may be applied to various types of electronic apparatuses.

[0058] In the present embodiment, although being able to detect both a touch and an approach, the touch sensor can detect only a touch. Alternatively, when the finger is within several millimeters from the back surface of the casing, the back-surface touch sensor **120** may detect this state as the contact.

[0059] In the circuit of the input device shown in **FIG. 3**, the signal is applied to each electrode in the time-sharing manner and the signal transmitting through each electrode is detected in the time-sharing manner. The input device may be constructed so that the signal transmitting through each electrode can be detected using another construction or procedure.

[0060] The input device detects a touch or an approach of the living body (or the finger) to a predetermined range of the display panel to perform an input process. However, the input process may be performed based on the detection of a touch or an approach of an input pen or the like in place of the living body.

[0061] In addition, the detection occurs only on the back surface of the display panel. However, touch sensors may be provided to the front surface as well as the back surface of the display panel so that a touch and an approach can be detected on both surfaces of the input device. For example, as shown in **FIG. 9**, a PDA **100'** includes a back-surface touch sensor **120a** provided on the back surface of the casing and a front-surface touch sensor **120b** directly below the display panel **110** for detecting a touch of the finger or the like on the back surface and the front surface of the display panel **110**.

[0062] When the back-surface touch sensor **120a** and the front-surface touch sensor **120b** are separately provided, the same type of operation input may be applied to the touch sensors **120a** and **120b** on the respective surfaces. However, different type of operation inputs may be applied to the touch sensors **120a** and **120b**.

[0063] For example, as shown in **FIG. 10**, the operation buttons **111** are displayed on the front surface of the display

panel **110** disposed on the PDA **100'**. One of the operation buttons **111** is selected with a touch of the finger **f11** on the back surface detected by the back-surface touch sensor **120a**. Here, an adjusting item selection is performed using the operation buttons **111**. The mark representing the touch position is displayed on the display panel **110**.

[0064] Below the display panel **110** is provided a level-adjusting pointer **113** disposed as a curve on the front surface of the display panel **110**. The level-adjusting pointer detects the position of a touch of the finger **f12** on the curve using the front-surface touch sensor **120b** and sets the detected touch position as the adjustment value.

[0065] An adjustment item can be selected in accordance with a touch position on the back surface of the device, and a value corresponding to the selected adjustment item can be set in accordance with a touch position on the front surface of the device. This realizes an advanced single-handed input operation shown in **FIG. 10**.

[0066] Although the fingers directly touch both of the front-surface and the back surface of the device in the example shown in **FIG. 10**, a device, such as the input pen, may be applied to either of the surfaces. As shown in **FIG. 11**, for example, the back-surface touch sensor **120a** may detect a direct touch of the finger on the back surface of the device (or an approach of the finger) and the front-surface touch sensor **120b** may detect a touch position of an input pen **90** on the front surface (or an approach position). In this case as well, an adjustment item may be selected in accordance with the position of a touch of the finger on the back surface, and a value corresponding to the selected adjustment item may be set in accordance with the position of a touch of the input pen on the front surface.

[0067] In the example shown in **FIG. 11**, the touch position pointer **112** is controlled so that the center of the touch position pointer **112** is overlapped with a volume-control button of the operation buttons **111** to adjust the volume. A level-adjusting pointer **114** is displayed on the display panel **110** in a bar graph manner in which an adjustment point **114a** is varied in accordance with the touch position of the input pen **90** on the front surface of the display panel **110** to adjust the volume. Thus, a combination of a touch of the finger on the back surface and a touch of the input pen on the front surface realizes an advanced input operation.

[0068] In these described examples, only the input process related to display is performed based on the touch position on the back surface (or the front surface) of the device. An actuator (for example, a piezoelectric element), which temporarily vibrates the device in response to pulse signals applied to the PDA **100**, may be provided in the PDA **100**. When a touch or an approach of the finger is detected, the actuator may be caused to temporarily vibrate the device to transmit vibrations to the user holding the device so that the feel of clicking is obtained when the back surface (or the front surface) of the device is touched. Alternatively, when the center of the touch position is overlapped with the display position of one of the operation buttons **111** to execute an input process, the actuator may be caused to temporarily vibrate the device so that the feel of clicking is obtained. This enables the user to easily recognize operation states and also improves the operability with aid of the display of the touch position on the display panel and the feel of clicking due to the vibrations.